REMARKS

The above listing of the claims supersedes any previous listing. Favorable reexamination and reconsideration are respectfully requested in view of the preceding amendments and the following remarks.

Claim amendments/Status

In this response, the subject matter of claim 7 has been introduced into independent claim 1 along with an amendment which clarifies the structure of the carbon nanotube. Accordingly claims 1-4 and 6, and 8-9 remain pending in this application.

According to claim 1, as amended above, the carbon nanotube is limited to the nanotube having specific stretch peaks in order to show that the claimed shielding material provides improved characteristics. The amendment of –OH bonding peak to N-H stretch peak corresponds to correction of a clerical error. Those skilled in the art will readily understand that this amendment should be regarded as the correction of a clerical error. It is also supported by page 25, Fig. 1 of the attached paper (Electrical conductivity of chemical modified multiwalled carbon nanotube/epoxy composites, Y.J. Kim et al., Carbon 43 (2005) 23-30). This paper is submitted in an IDS.

Amended claim 1 is directed to an electromagnetic shielding material comprising a polymer resin for a matrix, and a conductive filler including a carbon nanotube and a metal, in which the carbon nanotube has specific stretch peaks.

With the claimed subject matter, it is possible to improve the dispersion property and the electrical conductivity of the carbon nanotube, as well as the electromagnetic shielding effectiveness. Further, in case of not using the carbon nanotube aforementioned, the carbon nanotube has a bad interaction with the metal powders so that the electromagnetic shielding effectiveness may become poor (see paragraph [19], page 4 of the English specification).

Applicants submit the above-mentioned paper (Electrical conductivity of chemically modified multiwalled carbon nanotube/expoxy composites by Y. J. Kim et

al.), supports the inventive step of the present invention. This paper shows that carbon nanotube sample oxidized by the mixture of H_2O_2 and NH_4OH solution (B0) has a phenyl-carbonyl C-C stretch bonding peak existing between about 1,300 cm^{-1} and about 1,100 cm^{-1}, a carboxyl C=O stretch vibration peak existing at about 1,650 cm^{-1} and a N-H stretch peak existing at about 3,550 cm^{-1} (see page 25-27, especially "3.1. Influence of oxidation" of the reference).

This paper also discloses that the N-H stretch peak existing at about 3,550 cm^{-1} is only for the carbon nanotube sample oxidized by the mixture of H_2O_2 and NH_4OH solution (B0) and this carbon nanotube sample shows a good dispersion property and higher conductivity than other nanotubes (see pages 25-30, especially "3.2. Conductivity" of the reference). Moreover, such results are supported by the experimental examples in the reference.

The inventors of the present invention are included in the authors of the above-mentioned paper and the carbon nanotube recited in claim 1 is based on the outstanding findings disclosed in the above reference. At the time of filing this application, such a carbon nanotube could not be regarded as the commonly used technique in the technical field or the simple selection by those skilled in the art.

As above, the carbon nanotube recited in claim 1 can be prepared through oxidation by the mixture of H_2O_2 and NH_4OH solution and show the specific peaks, especially the N-H stretch peak existing at about 3,550 cm^{-1}. Such a carbon nanotube can show a good dispersion property and higher conductivity, and therefore improved electromagnetic shielding effectiveness. This is submitted as amount to a surprising result and therefore indicative of an inventive discovery.

However, JP 2002-290094, US 6,528,572 and US 2004/0028859 (hereinafter, cited reference 3) do not disclose or suggest the carbon nanotube having specific peaks listed in claim 1. Moreover, there is no disclosure in the cited references that the dispersion property, the conductivity and the electromagnetic shielding effectiveness can be improved by using the carbon nanotube having specific

characteristics through the specific modification. We again note the total absence of any suggestion of the present invention in the cited references.

Accordingly, the Examiner's assertion appears overly flavored with a full working knowledge of the claimed subject matter. It is impossible to derive the technical constitution of the present invention and expect the significant effect of the present invention from the cited references.

Rejections under 35 U.S.C. § 102/103

The rejections of:

Claims 1-4, 6 and 8-9 are rejected under 35 U.S.C.§ 102(b) as anticipated by or, in the alternative, under 35 U.S.C. § 103(a) as obvious over JP 2002-290094;

Claims 1-4, 6 and 8-9 are rejected under 35 U.S.C. §102(b) as anticipated by or, in the alternative, under 35 U.S.C.§ 103(a) as obvious over Patel et al (6,528,572) and

Claims 1-4, 6 and 8-9 are rejected under 35 U.S.C.§ 102(e) as anticipated by or, in the alternative, under 35 U.S.C.§ 103(a) as obvious over LeGrande et al. (2004/0028859);

are again traversed.

As noted *supra,* none of the cited references discloses the subject matter set forth in claim 1 as amended which is submitted as setting forth novel and non-obvious subject matter.

More specifically, they all disclose the use of a polymer resin, carbon nanotubes and a metal.

The JP-2002-290094 reference discloses the use of thermoplastic resins as different from the thermosetting requirement of amended claim 1 to differentiate over this reference. It does however, disclose nanotubes – see [0014] and metal fibers – see [0022].

USP 6,528,572 is such that claim 8, for example, recites that an electrically conductive filler is selected from the group consisting of carbon fibers, vapor grown carbon fibers, carbon nanotubes, carbon black, conductive metal fillers, conductive non-metal fillers, metal coated substrates, and mixtures comprising at least one of the foregoing electrically conductive fillers.

US 2004/0028859, is such that the abstract of this publication sets forth that the disclosed invention is a coating composition having outstanding electrically conductive and electromagnetic radiation absorptive properties which uses is disclosed with a water emulsion polymer binder. The binder is a blend of a first emulsion containing a conjugated diene as monomer or comonomer, and a second emulsion containing an acrylic, aliphatic or aromatic polyurethane, polyester urethane, polyester, epoxy, polyamide, polyimide, vinyl, fluoropolymer, or silicone polymer. An effective amount of electrically conductive and electromagnetic radiation absorptive particles is dispersed in the binder. The particles include a combination of graphite particles, carbon nanotubes and metal containing particles. An effective amount of water is also present.

It should be noted, however, that while the polymeric material is dispersed in water and is applied as a paint, and that the paint when it cures – see paragraph [0043] – will form a matrix. Nevertheless, the polymer is not specifically classified as being either thermosetting or thermoplastic.

The above analysis of the references is such that the references are taken one-by-one may have had some relevance to the subject matter of claim 1, the amendment of claim 1 is such as to render anticipation and obviousness issues both moot.

In response to the Examiner's position that there is no comparative data that shows improved shielding, Applicants respectfully draw the Examiner's attention to the comparative data set forth in tables 1, 2 and 3 and the associated discussion of the same in the originally filed specification. In that the specification is submitted with a declaration, its content should be accepted as evidence.

Conclusion

It is respectfully submitted that the claims as they have been amended are allowable over the art which has been applied in this Office Action. Favorable reconsideration and allowance of this application are courteously solicited.

To the extent necessary, a petition for an extension of time under 37 C.F.R. 1.136 is hereby made. Please charge any shortage in fees due in connection with the filing of this paper, including extension of time fees, to Deposit Account 07-1337 and please credit any excess fees to such deposit account.

Respectfully submitted,
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